

Lake Superior State
Forest Sustainable
Forest Management
Pilot Project

REPORT

4



Michigan Department of Natural Resources Operations Inventory: Survey Results

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1. Introduction

In order to gain a better understanding of the operations inventory, a survey was undertaken to help identify key pieces of information that will be useful in forest management planning, quantifying indicators of sustainability and developing forest management models.

The operations inventory contains more than 50 individual stands or compartment variables. In the survey, respondents were asked to rate 33 of the individual inventory stand attributes (data elements) in terms of reliability and usefulness, and to give each an overall ranking with respect to its use in forest planning or in determining forest/landscape sustainability indicators.

The scoring of the various stand attributes for the three data features was based on the regime presented in Table 1.

Table 1. Attribute scoring regime.

Score	Reliability	Usefulness	Ranking
1	High 100 - 81%	High 100 - 81%	Absolutely essential
2	Good 80-61%	Good 80-61%	Useful information
3	Moderate 60% - 41%	Moderate 60% - 41%	Could be improved
4	Weak 40% - 21%	Weak 40% - 21%	Relatively useless
5	Unreliable 20% - 0%	Unreliable 20% - 0%	Drop from inventory
9	Don't know	Don't know	Don't know

Respondents were also asked to describe some of the strengths and weaknesses of the operations inventory for the purposes of compartment planning, yield estimation, and resource values identification. The survey form used is presented in Table 2.

Table 2. Survey form.

Stand Attribute	Reliability	Usefulness	Ranking
Stand Acreage			
Stand Cover Type			
Area Class			
Influence Zone			
Size Density			
Stand Condition of Featured Stand			
Method of Cut			
Merchantability			
Treatment Period			
Management Status (reproduction)			
Management Objective Type			
Cultural Need			
Cultural Method (site prep)			
Priority of Cultural Treatment			
TSI Basal Area			
Harvest Cutting Priority			
Total Basal Area			
Average DBH			
Understory Type			
Understory Stocking			
Special Management Area Potential			
Special Wildlife Practices			
Ground Cover			
Soil Type			
Insects, Diseases, Other Problems			
Stand Year of Origin			
Cut Code			
Total Stand Volume (cords)			
Sawtimber Volume (bd.ft.)			
Compartment Attributes			
Featured Wildlife Species			
Priority of Featured Wildlife Species			
Habitat Condition			
Wildlife Openings Needed			

2. Survey Results

Survey responses were received from 13 MDNR staff from both main office and the field. Six responses came from the Shingleton office, three from Lansing, two from Newberry, one from Naubinway-Sault, and one from Manistique. Six of the responses came from forest technicians, with the remainder coming from foresters, analysts and planners.

The results are presented in Tables 3 through 5. For each variable and category (reliability, usefulness and ranking), the average response score and a derived percentage are listed. In compiling the results the "9" scores ("don't know") were left as blanks (non-contributing).

Table 3 presents the results sorted by reliability. Seven of the attributes are considered to be more than 70% reliable (average score less than 2.0). Twenty-seven of the 33 variables rank above the 50% level and are therefore considered moderately to highly reliable. Six attributes are rated at 50% or less (average score 3.0 or greater).

In Table 4, results have been ranked on the basis of usefulness. Thirteen of the attributes are considered to have a usefulness of more than 70% (average score less than 2.0). Thirty of the 33 variables rank above the 50% level and are therefore considered moderately to highly useful. Three attributes are rated at 50% or less (average score 3.0 or greater).

An examination of Table 5, in which the overall ranking is the sort key, shows that seven of the attributes are considered to have a greater than 70% ranking over all for use in planning (average score less than 2.0). Twenty-eight of the 33 variables rank above the 50% level and are therefore rated moderate to high over all. Five attributes are rated at 50% or less (average score 3 or greater).

An examination of the top seven variables in each of the tables reveals that five variables are common to all: Acreage, Cover Type, Method of Cut, Management Objective Type and Size Density. This group of five will be important in the development of the Strategic Forest Management Model.

The next most "influential" attributes in the survey are: Total Basal Area, Cultural Need, Treatment Period, Influence Zone, and Understory Stocking.

The wildlife variables and the TSI Basal Area are seen as the weakest data in the operations inventory.

In general, it can be seen that data usefulness and overall ranking scores exceed those of reliability.

Table 3. Survey results sorted by perceived "reliability".

Rank	Stand Attribute	Reliability		Usefulness		Ranking	
		Avg.	%	Avg.	%	Avg.	%
1	Method of Cut	1.58	78	1.50	80	1.75	75
2	Acreage	1.62	78	1.15	87	1.08	88
3	Influence Zone	1.64	77	1.91	72	2.25	65
4	Cover Type	1.69	76	1.31	84	1.31	84
5	Cut Code	1.82	74	2.45	61	3.25	45
6	Management Objective Type	1.83	73	1.42	82	1.58	78
7	Size Density	1.85	73	1.31	84	1.54	79
8	Stand Condition	2.00	70	1.85	73	2.23	65
9	Area Class	2.00	70	2.50	60	2.50	60
10	Total Basal Area	2.08	68	1.77	75	1.42	82
11	Cultural Need	2.08	68	1.58	78	1.75	75
12	Merchantability	2.17	67	2.50	60	2.67	57
13	Treatment Period	2.18	66	1.73	75	2.09	68
14	Average DBH	2.31	64	2.08	68	2.00	70
15	Understory Type	2.38	62	1.75	75	2.17	67
16	Management Status	2.38	62	2.15	67	2.38	62
17	Cultural Method	2.42	62	1.92	72	2.25	65
18	Understory Stocking	2.54	59	1.83	73	2.17	67
19	Insects, Disease, Other Problems	2.55	59	2.00	70	2.18	66
20	Stand Year of Origin	2.62	58	2.08	68	2.17	67
21	Featured Wildlife Species	2.67	57	2.88	53	2.67	57
22	Total Stand Volume	2.70	56	2.45	61	2.27	65
23	Sawtimber Volume	2.70	56	2.45	61	2.36	63
24	Priority of Cultural Treatment	2.73	55	2.45	61	2.73	55
25	Soil Type	2.75	55	2.00	70	2.08	68
26	Priority of Featured Wildlife Species	2.78	54	2.88	53	3.13	48
27	Harvest Cutting Priority	2.83	53	2.64	57	2.73	55
28	Ground Cover	3.00	50	2.00	70	2.00	70
29	Special Wildlife Practices	3.00	50	2.89	52	2.73	55
30	Special Management Area Potential	3.17	47	2.36	63	2.58	58
31	TSI Basal Area	3.17	47	3.45	41	3.18	46
32	Habitat Condition	3.50	40	3.43	41	3.38	43
33	Wildlife Openings Needed	3.89	32	3.75	35	3.90	32

Table 4. Results sorted by perceived "usefulness".

Rank	Stand Attribute	Reliability		Usefulness		Ranking	
		Avg.	%	Avg.	%	Avg.	%
1	Acreage	1.62	78	1.15	87	1.08	88
2	Cover Type	1.69	76	1.31	84	1.31	84
3	Size Density	1.85	73	1.31	84	1.54	79
4	Management Objective Type	1.83	73	1.42	82	1.58	78
5	Method of Cut	1.58	78	1.50	80	1.75	75
6	Cultural Need	2.08	68	1.58	78	1.75	75
7	Treatment Period	2.18	66	1.73	75	2.09	68
8	Understory Type	2.38	62	1.75	75	2.17	67
9	Total Basal Area	2.08	68	1.77	75	1.42	82
10	Understory Stocking	2.54	59	1.83	73	2.17	67
11	Stand Condition	2.00	70	1.85	73	2.23	65
12	Influence Zone	1.64	77	1.91	72	2.25	65
13	Cultural Method	2.42	62	1.92	72	2.25	65
14	Insects, Disease, Other Problems	2.55	59	2.00	70	2.18	66
15	Soil Type	2.75	55	2.00	70	2.08	68
16	Ground Cover	3.00	50	2.00	70	2.00	70
17	Average DBH	2.31	64	2.08	68	2.00	70
18	Stand Year of Origin	2.62	58	2.08	68	2.17	67
19	Management Status	2.38	62	2.15	67	2.38	62
20	Special Management Area Potential	3.17	47	2.36	63	2.58	58
21	Cut Code	1.82	74	2.45	61	3.25	45
22	Total Stand Volume	2.70	56	2.45	61	2.27	65
23	Sawtimber Volume	2.70	56	2.45	61	2.36	63
24	Priority of Cultural Treatment	2.73	55	2.45	61	2.73	55
25	Area Class	2.00	70	2.50	60	2.50	60
26	Merchantability	2.17	67	2.50	60	2.67	57
27	Harvest Cutting Priority	2.83	53	2.64	57	2.73	55
28	Featured Wildlife Species	2.67	57	2.88	53	2.67	57
29	Priority of Features Wildlife Species	2.78	54	2.88	53	3.13	48
30	Special Wildlife Practices	3.00	50	2.89	52	2.73	55
31	Habitat Condition	3.50	40	3.43	41	3.38	43
32	TSI Basal Area	3.17	47	3.45	41	3.18	46
33	Wildlife Openings Needed	3.89	32	3.75	35	3.90	32

Table 5. Survey results sorted by overall ranking.

Rank	Stand Attribute	Reliability		Usefulness		Ranking	
		Avg.	%	Avg.	%	Avg.	%
1	Acreage	1.62	78	1.15	87	1.08	88
2	Cover Type	1.69	76	1.31	84	1.31	84
3	Total Basal Area	2.08	68	1.77	75	1.42	82
4	Size Density	1.85	73	1.31	84	1.54	79
5	Management Objective Type	1.83	73	1.42	82	1.58	78
6	Method of Cut	1.58	78	1.50	80	1.75	75
7	Cultural Need	2.08	68	1.58	78	1.75	75
8	Average DBH	2.31	64	2.08	68	2.00	70
9	Ground Cover	3.00	50	2.00	70	2.00	70
10	Soil Type	2.75	55	2.00	70	2.08	68
11	Treatment Period	2.18	66	1.73	75	2.09	68
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15	Insects, Disease, Other Problems	2.55	59	2.00	70	2.18	66
16	Stand Condition	2.00	70	1.85	73	2.23	65
17	Influence Zone	1.64	77	1.91	72	2.25	65
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21	Management Status	2.38	62	2.15	67	2.38	62
22	Area Class	2.00	70	2.50	60	2.50	60
23	Special Management Area Potential	3.17	47	2.36	63	2.58	58
24	Merchantability	2.17	67	2.50	60	2.67	57
25	Featured Wildlife Species	2.67	57	2.88	53	2.67	57
26	Priority of Cultural Treatment	2.73	55	2.45	61	2.73	55
27	Harvest Cutting Priority	2.83	53	2.64	57	2.73	55
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30	TSI Basal Area	3.17	47	3.45	41	3.18	46
31	Cut Code	1.82	74	2.45	61	3.25	45
32	Habitat Condition	3.50	40	3.43	41	3.38	43
33	Wildlife Openings Needed	3.89	32	3.75	35	3.90	32

3. Comments

Respondents to the survey were asked to provide their written comments on the strengths and weaknesses of the operations inventory. Below we have provided some of the more typical and revealing comments.

"..quite good at what it is designed to do, that is, schedule timber harvests. It is not so good at doing many other things, because it was not designed to do them...."

"Guidelines on how to code some of these and other attribute data are unclear ... data consistency is a big problem..."

"... it is not good at stand volumes, because the sample size is small, if done at all."

"...The major problem is that we do not have enough time to examine every stand thoroughly..."

" The process is needed and useful, but the data are often not up-to-date, especially in less important fields."

"Yield figures are weak..."

"My main concern is that O.I. has traditionally been used as a forestry database and very little as a wildlife management database."

"... wildlife staff spend very little time, if any, coding such fields as Featured Wildlife Species..."

" Doesn't document certain resource aspects for fear they will drastically alter a preferred outcome (?)...."

"Time constraints prevent our doing a proper job."

"Sometimes it is hard to classify a mixed(wood) stand into a single timber type."

"Stand Condition and Values are tied to other fields that don't necessarily describe the stand accurately."

"While the current O.I. system may contain sufficient information for timber management, much more information on fauna is needed for true ecosystem planning."

"It is an excellent tool for planning timber sales."

"... activities such as recreation, roads and prescribed burning are not well integrated..."

"It is a timber inventory; it therefore is quite limited in its usefulness in identifying other resource values."

"Yield estimates are highly suspect, though they have coincided well with FIA derived estimates."

"What it does not (nor does compartment planning) address is how this timber stand tool fits within a larger ecosystem and landscape planning."

4. Perspectives

It seems to be a universal truth in forestry that everyone has a problem with the inventory.

To gain an understanding of how we in the LSSF SFM project team will use the operations inventory data we currently have, it may be helpful to describe briefly Ontario's Forest Resource Inventory (FRI) and how it is used. The FRI has some similarities to the MDNR operations inventory; each is a stand-based photo-interpreted inventory. Both inventories carry similar data such as stand size, year of origin, stand volume, and stand type, to name a few.

Common to both Ontario and Michigan inventory users is the criticism of stand volumes. In Ontario the starting point for yields is a set of provincial empirical yield tables (Plonski's Tables) that were developed in the 1950s and have been fine-tuned since then. Local and regional yields tables have been developed around the province and are in use in some places. In Ontario, when we compare planned harvest volumes with actual recoveries, planned volumes may be $\pm 5\%$ to $\pm 10\%$ at the forest management unit level. At the stand level, there may be large discrepancies in the volumes and stand descriptions.

There are some significant differences between the Michigan and Ontario inventories.

The Ontario inventory is carried out on all lands, regardless of ownership, on a 20-year cycle. Every 20 years the lines are rubbed out, new photos are taken, 1-2% of the forest is cruised, the photos are interpreted, and an inventory is generated. Every 5 years the inventory must be updated as part of the planning process. The Michigan system is a continuous 10-year inventory with an unspecified level of ground-truthing (cruising).

The Ontario FRI was developed for forest management planning in areas of 25,000 to 1,000,000 hectares. At the aggregate level (land type, working group, and age class), it is a sound inventory. The FRI traditionally contains mostly land classification and "biological" data. The operational data carried in the Michigan operations inventory is generally kept in separate (related) data bases. Stand records describe the area of each stand, the composition of the forest by tree species present (the dominant species becomes the working group), stand year of origin, average height and DBH of dominant species, stand stocking (based on basal area), trees per acre, and site class. Along with classifiers for "eco-site", these provide a robust inventory for planning and a sound basis for modeling.

A further difference between the two jurisdictions is the coding of individual variables. The FRI is the only system in Ontario in which the coding is rigorously applied and is very clearcut. There is no ambiguity in the coding of data collected in the field or carried in the inventory. Timber cruisers and photo-interpreters are rigorously trained, and soon will be certified.

5. Conclusions and Next Steps

On the basis of the survey results, it can be concluded that the operations inventory contains a vast array of variables, some more reliable and useful than others, and is a sound planning tool for compartment timber sales. The operations inventory is weakest in dealing with wildlife variables.

The LSSF SFM project team is developing a Strategic Forest Management Model of the LSSF. The 1997 LSSF operations inventory data will form the basis of the model and the results of the operations inventory survey will help guide our use of the operations inventory data.

Acknowledgments

We would like to thank all those who submitted survey forms and comments.

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Project Partners:

Michigan Department of Natural Resources

Mater Engineering, Ltd.

Smartwood

BioForest Technologies Inc.

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Reports generated by this project include:

Project Summary: The Lake Superior State Forest Sustainable Forest Management Pilot Project

An Assessment of the Michigan Department of Natural Resources' Commitment to Sustainable Forest Management

The Lake Superior State Forest: A Description

Michigan Department of Natural Resources Operations Inventory: Survey Results

Roles and Responsibilities for Forest Management Planning in the Lake Superior State Forest

Public Participation in Forest Management Planning in the Lake Superior State Forest: Finding the Right Pathway

Establishing Criteria and Indicators for the Lake Superior State Forest

Workshop I Summary: Values and Indicators of the Lake Superior State Forest

Workshop II Summary: Establishing Targets, Practices and Responsibilities for the Indicators of the Lake Superior State Forest

Modeling Forest Management on the Lake Superior State Forest

Wildlife Habitat Projections for 15 Species in the Lake Superior State Forest

Risk Assessment of Forest Management for the Lake Superior State Forest

A Forest Management Planning Guide for the Lake Superior State Forest

Further information on this report or any of the reports listed may be obtained from:



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